

Raymond Baltar, Green MBA  
Director SBI

Biochar Development in Sonoma County

6 Years on the Front Lines  
of Biochar Education & Training





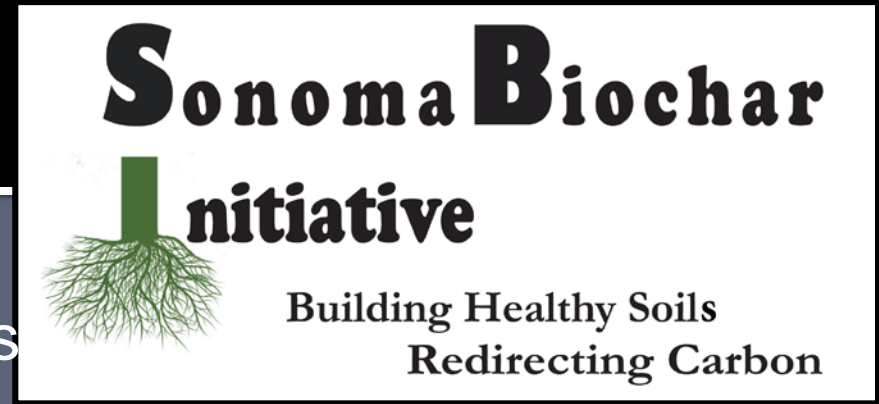
- Who we are
- Our activities
- Key elements for biochar industry development
- Observations

# What if you discovered a technology that...

- 1) Used wasted or underutilized natural resources (millions of tons of woody biomass)
- 2) Produced two kinds of renewable energy (heat and gases)
- 3) Produced a valuable by-product in the process (biochar)
- 4) Benefited agriculture in a number of important ways (building healthier soils that retain more moisture and nutrients thereby lowering water and input costs for farmers)
- 5) Could also be used by a number of industries to create new products or replace more expensive materials in existing products (including stormwater treatment and pollution control, air filtration, construction insulation, feed supplement, electronics, etc.)
- 6) Could prevent a significant amount of carbon from entering the atmosphere, helping to safely and beneficially address climate change?

# Start an organization in 2010 to promote it!

*Mission:* Engage, educate and inspire policy makers, enterprises organizations, and individuals involved in sustainable forestry and agriculture, renewable energy, and climate change solutions, as well as the general public, about the many benefits provided through the production and use of biochar.  
Make biochar locally & sustainably!



# Key Players:

- *Richard Dale*: ED Sonoma Ecology Center
- *Dr. David Morell*, Ph.D: Retired EPA Administrator, Author, Environmental Studies Professor
- *Peter Hirst*: Co-Owner New England Biochar, Author & Lecturer
- *Susan Haydon*: 20-year veteran of Southern Sonoma County Resource Conservation District, now working for the Sonoma County Water Agency
- *Ray Gallian*: Former City of Sonoma Planning Commission Member & Political Gadfly
- *Raymond Baltar*: Environmentalist MBA with an interest in the development of sustainable agriculture



SBI board in front of the Adam-Retort purchased with a USDA Conservation Innovation grant and matching funding from the Sonoma County Water Agency



# Collaborations

## Other Collaborators & Supporters:

- *Brian Sessor*: Lead Scientist, Sonoma Ecology Center
- *Tony Passentino*: Education Director at Sonoma Ecology Center
- *Cuauhtemoc Villa*: Native American educator bridging the gap between indigenous farming knowledge and modern agricultural techniques
- *Miles Atchison*: Engineer/Inventor with an interest in small-scale biochar kiln technologies
- *Jack Betourne*: Former pollution regulator turned pollution control consultant to ag and industry



- *USDA/NRCS*
- *Gold Ridge Resource Conservation District*
- *Sonoma County Water Agency*
- *North Coast Conservation and Development District*
- *CAFF / Community Alliance with Family Farmers*
- *Banchero Tree Service*
- *Sue Smith / Circle Bar Ranch*

# Keys to Biochar Development

## SCIENCE:

- Life cycle analysis for a range of biochars in various applications / Complete carbon footprint
- Standardized biochar testing and application protocols / Determining which biochars work in which soil types with which plant types
- Large-scale field trials in California

# 2014



SBI participated  
in meetings  
with CDFA  
Secretary Karen Ross  
and the California  
Science Advisory  
Panel to discuss  
large-scale, statewide  
biochar field trials.



# The Sonoma County Biochar Project

A Conservation Innovation Grant Project

## PARTNERS:

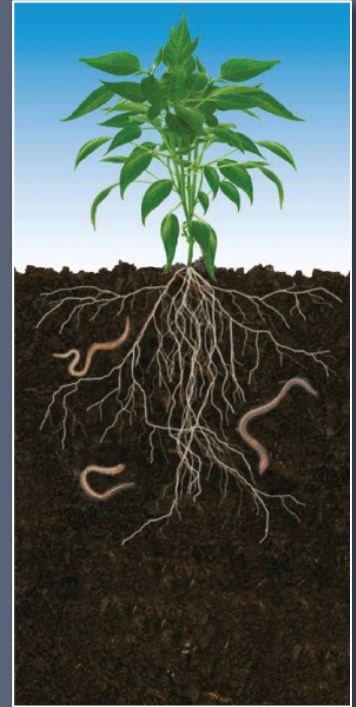
- Sonoma Biochar Initiative
- Sonoma Ecology Center
- USDA/NRCS
- Sonoma County Water Agency
- Goldridge RCD
- North Coast Resource Conservation & Development District
- New England Biochar



- Banchemo Tree Service
- Swallow Valley Farm
- Greenstring Farm
- Oak Hill Farm

# Biochar Project Goals

- Analyze farm-scale production technology
- Measure water and nutrient retention capabilities in diverse soil types
- Measure effects on plant production
- Measure effects on soil porosity & tilth
- Study biochar's efficacy in wastewater filtration & explore uses for process heat



# Fall

## 2014



Received delivery  
& began operation  
of the Adam-Retort



Sonoma Biochar Initiative

# Local Feedstock Acquisition & Preparation

Komptech  
Crambo



Photo: Raymond Baltar



# Spread a biochar/compost blend on pastureland





# Spread on Other Farms / June - August 2015

Preliminary, non peer-reviewed results: 25% more moisture in test over control plots



Oak Hill Farm / Glen Ellen



Green String Farm /  
Petaluma

# Keys to Biochar Development

## COMMUNITY EDUCATION

- Build community awareness through biochar workshops & seminars; teach forestry, ag, and entrepreneurial groups about biochar's potential
- Train forestry and agricultural crews to use the Conservation Burn technique on slash and biomass piles
- Give hands-on demos at community and school gardens



- Planned and hosted the U.S. Biochar Conference at Sonoma State University

## ***SBI Citizen Science*** **Biochar Experiment**



Take part in a “groundbreaking” local biochar study with 200 home and school gardeners!

***Click here for more information.***

- 2013, 5-month Citizen Science Project: engaged a large number of school, community, and home gardeners in biochar use using a photo monitoring protocol

# Keys to Biochar Development

## STAKEHOLDER EDUCATION

Build working relationships with existing agricultural and forestry stakeholders such as RCD's, land trusts, open space districts, forest, farm and ranch landowners, UC Extension services, registered professional foresters, etc. to leverage cooperative grant opportunities and teach the conservation burn technique.





Over 300  
chemicals  
released

# Typical Open Ag or Forest Burn





## Top-lit Conservation Burn





# Clos du Bois Winery / Constellation Brands Vineyard in Geyserville



Sonoma Biochar Initiative

**SBI does NOT advocate the Conservation Burn as a sustainable way to make biochar commercially.**



**Only if:**

- You're already doing open burning
- You want to produce less pollution
- And ideally you can put the biochar to some beneficial use







**CAL  
FIRE**



- Our Cal Fire Grant Proposal for expansion of the Conservation Burn Training Program statewide is pending



# Keys to Biochar Development

## POLICY CHANGES



- Improve Waste Stream Management – More feedstock availability
- Improve Forest Management Practices – More feedstock availability
- Increase Community Choice Aggregation – To stimulate demand for locally produced renewable energy, including from biomass where appropriate
- Approve a national Biochar Greenhouse Gas Quantification Protocol as an acceptable offset (as was just done by in California by CAPCOA)

# Keys to Biochar Development

## BUSINESS INVESTMENT: *Improved Technology*

- Cheaper, more robust and dependable gasifiers
- Continuous feed & automated infrastructure
- Medium to farm-scale production units
- Biochar processing equipment including dryers, conditioners, blenders
- Regional, “carbon-shed” gasification plants co-located where both the heat and gases can be utilized and ideally near a composting facility
- Mobile units for certain forestry applications

# Keys to Biochar Development

## BUSINESS INVESTMENT: *Product Development*

- Soil amendment blends for consumer and ag markets
- Stormwater treatment “bags” for urban sewers
- Pollution control wattles for agricultural lands and construction sites
- Animal feed applications to reduce enteric methane release in ruminants
- Poultry litter additive to reduce odors
- Construction applications for wine cellars to control moisture
- Mine reclamation applications
- Air & water filtration applications for water treatment plants/industry

# Key Observations

*Biochar and compost production and use are synergistic and complimentary, not competitive!!!*

The International Biochar Initiative website states:  
“Ideal feedstocks for composting have from 60 – 70% moisture, high nutrient levels, and low lignin content. Ideal feedstocks for biochar have 10 – 20% moisture and high lignin content, such as field residues or woody biomass.”

# Key Observations

“Based on current findings, the benefits of adding biochar to the composting process may include shorter compost times; reduced rates of GHG emissions (methane,  $\text{CH}_4$  and nitrous oxide,  $\text{N}_2\text{O}$ ); reduced ammonia ( $\text{NH}_3$ ) losses; the ability to serve as a bulking agent for compost; and reduced odor. For the biochar material itself, undergoing composting helps to charge the biochar with nutrients without breaking down the biochar substance in the process.” IBI Website

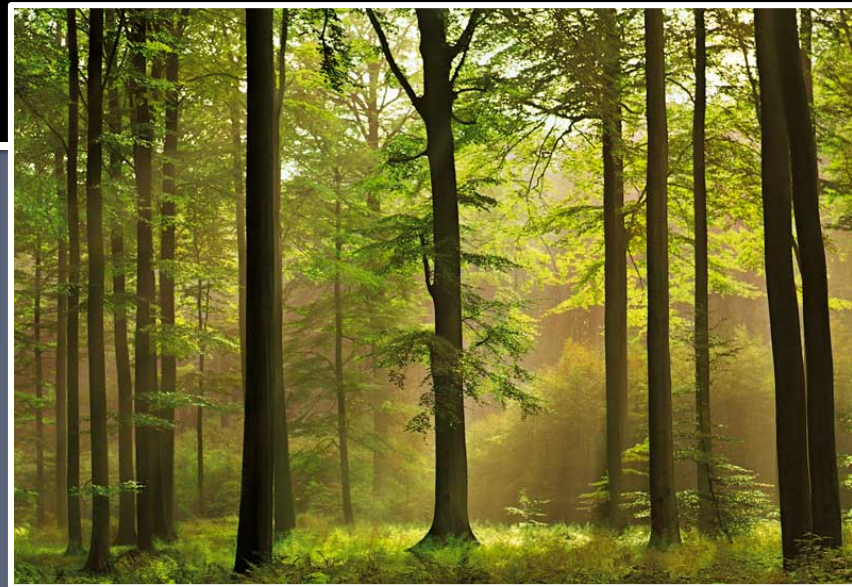


# Key Observations

Non-agricultural markets for biochar will need to be developed to scale biochar production, reducing the price enough for widespread, mainstream agricultural use. It is still a specialty product rather than a commodity.

We must get the specific usage data needed by farmers and the organizations serving them to make intelligent decisions about biochar use and application

There are real opportunities for innovation and entrepreneurial activities in the biochar field. The California market, while growing, is still wide open. Act now and don't wait for the competition to catch up.



**Sonoma Biochar**



**Initiative**

Building Healthy Soils  
Redirecting Carbon

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